Older people’s use of non-pharmacological interventions for chronic, non-cancer pain and comfort

Michele Shropshire, Stephen Stapleton, Myoung Jin Kim et al

Abstract

Background Many older people experience chronic pain, so increased comfort and pain relief are important for older residents in assisted and/or supported-living environments. While several studies have found that people using non-pharmacological interventions without taking pain medication experienced significant differences in pain, the effect of non-pharmacological interventions on comfort and chronic pain in older people has not been studied.

Aim To assess differences in comfort and pain among older people in assisted and supported-living facilities who had chronic, non-cancer pain and who used or did not use non-pharmacological interventions.

Method A descriptive, comparative, cross-sectional pilot study with a convenience sample of 82 participants from 11 assisted and supported-living facilities. Three questionnaires were used to obtain data on the independent variable of use/non-use of non-pharmacological interventions and the dependent variables of perceived comfort and pain. Multivariate analyses of variance were computed to measure differences between the use/non-use groups, and Roy-Bargmann stepdown analyses were computed to further subdivide and analyse the groups who were using and not using pain medication.

Results No significant differences were found in chronic pain and perceived comfort between participants who did or did not use non-pharmacological interventions if they were not also taking pain medication. However, when participants were also taking pain medication, chronic pain and perceived comfort scores were significantly affected by the use of non-pharmacological interventions. The most common non-pharmacological interventions were exercise, heat therapy, spiritual activity/religion and listening to music.

Conclusion Older people using non-pharmacological interventions and taking pain medication had higher perceived comfort scores and lower pain scores than those using pain medication only. Relationships between non-pharmacological interventions and comfort should be explored further. With minor changes, this pilot study design could be used with a larger sample.

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Keywords

chronic pain, older people, pain, pain management

THE LEADING contributory factor to disability among older adults is chronic, non-cancer pain (American Chronic Pain Association (ACPA) 2019), which is defined as ‘pain without apparent biologic purpose that has persisted beyond the normal tissue healing time, variously defined as 3-6 months’ (Periyakoil 2018). The consequences of chronic pain include negative physical outcomes, such as decreased sleep and mobility (Herr 2010, Koenig 2012), constipation and limited ability to complete activities of daily living (ADL) (Darnall 2018). Psychological outcomes include depression, anxiety and...
declining cognitive processes (Kaye et al 2010, Dueñas et al 2016, Bierman and Lee 2018, Darnall 2018). Physical and cognitive decline stemming from chronic pain then often exacerbates health limitations, creating an unpleasant spiral (Herr 2010, Darnall 2018). Chronic pain is difficult to manage and may be complicated by limits on prescribing for older adults (Gua et al 2002, Boltz et al 2016). Non-pharmacological treatments include heat/cold therapy, exercise, massage and acupuncture (Park and Hughes 2012).

An estimated 1 million older Americans reside in assisted and supported-living facilities (Centers for Disease Control and Prevention 2019), where 30-60% of residents experience non-cancer pain daily (Centers for Medicare and Medicaid Services 2017). An assisted-living facility is a ‘residential setting that provides general, protective oversight and/or assistance with activities necessary for independent living to mentally or physically limited persons’ (US Department of Health and Human Services (US DHHS) 2015). A supported-living facility is ‘an alternative to nursing home care for low-income older persons... under Medicaid’, offering personal care and other services (Illinois Department of Healthcare and Family Services 2019).

In both types of facilities, assistance with ADL is offered at a minimal level and skilled nursing care is not available. Individual states may have different requirements, but admission generally requires older adults to live independently and need assistance with no more than two ADL (Zimmerman and Sloane 2007), such as managing medication and preparing meals. Residents are encouraged to take part in healthcare decisions but must be functionally independent and able to live in apartment-style rooms without assistance.

To promote the independence of older people in assisted and supported-living facilities and avoid relocating them to higher levels of care, such as nursing homes, chronic pain must be managed (Allcock et al 2002, D’Arcy 2010, Morgan et al 2016). By 2040, nearly 82.3 million people in the US will be older than 65 years, a significant proportion of whom will likely experience chronic pain associated with degenerative and/or neuropathic disease(s) (US DEHHS 2015). As the population of older people increases, chronic, non-cancer pain management will remain a salient topic.

**Pain and comfort**

The study was guided by Kolcaba’s (2003) theory of comfort, which postulates a holistic approach to decrease chronic pain and increase comfort. The theory comprises four dimensions: physical, psychospiritual, environmental and sociocultural comfort (Figure 1). Each dimension supports a non-pharmacological intervention: physical comfort includes heat/cold therapy, psychospiritual comfort includes spiritual activity/religion, environmental comfort includes room temperature, and sociocultural comfort includes the presence of family and friends.

Chronic pain is a significant distractor from comfort. Most often, a desired objective in pain management is a decreased or tolerable level of pain and an increased perceived state of comfort (Weaver 2009, Darnall 2018). Perceived comfort for the older person may be a relaxed physical and mental presence, with a feeling of ease and/or calm (Kolcaba 2003, Nichols 2018).

Older adults may use a combination approach with medication and non-medication to help manage chronic pain (McCleane and Smith 2006). Perceived comfort and chronic pain may be affected by the use of non-medication interventions, defined as ‘pain treatment techniques that do not involve pharmacological (drug) involvement for chronic pain’ (ACPA 2019), and recommended by the American Medical Directors Association (AMDA) in older people as adjunct treatment for chronic pain (AMDA 2012). Theoretically, a psychological-physiological association exists in the affective-emotional area of the brain in response to pain stimuli (Pasero and McCaffery 2011), leading to the connection between pain and comfort (Nichols 2018).

As multiple variables such as pain location, length of time with pain and past experiences

### Figure 1. Kolcaba’s dimensions of comfort

- **Implications for practice**
  - Assessing pain and comfort in older people who experience chronic, non-cancer pain using validated questionnaires may help to plan effective pain treatment
  - Offering non-pharmacological interventions, such as exercise, heat therapy, spiritual activity/religion and music, in addition to pain medication may help to reduce pain and improve comfort for older people with chronic, non-cancer pain
  - Further exploration is needed of non-pharmacological interventions for pain relief in older people in assisted and supported living facilities
of pain influence a person’s pain perception, engaging in non-pharmacological activities may assist in achieving a perceived state of comfort and decreased pain (McCleane and Smith 2006).

While several studies have found that people using non-pharmacological interventions for chronic pain experienced significant differences in pain (Hughes et al 2006, Ersek et al 2008, Green et al 2009, Tse et al 2011, Sawynok and Lynch 2014), the effect of non-pharmacological interventions on comfort and chronic pain in older people in assisted-living environments has not been studied.

**Aim**

The aim of this study was to assess differences in comfort and pain among older people in assisted and supported-living facilities who had chronic, non-cancer pain and who used or did not use non-pharmacological interventions. Focusing on older adults experiencing chronic, non-cancer pain in assisted and supported-living facilities, we hypothesised that older adults with chronic pain who used non-pharmacological interventions would experience greater comfort and less pain than their counterparts who did not use these interventions. Older people may use a treatment approach that includes medication and ethical considerations would discourage disuse. Therefore, we examined non-pharmacological approaches with medication as a confounding variable, as medication may have influenced the dependent variables of chronic pain and perceived comfort.

**Method**

**Pilot study**

Pilot studies fulfil a valuable role in health research and may lead to design and process modifications for future larger studies (Lancaster et al 2004). Therefore, because chronic pain is not adequately addressed (Denny and Guido 2012, Centers for Medicare and Medicaid Services 2017) and non-pharmacological interventions may offer benefits to older residents of assisted and supported-living facilities experiencing chronic pain, we conducted a pilot study to determine if the study’s protocols, data collection methods and instruments were feasible to use in this population.

**Study sample**

A descriptive, comparative, cross-sectional study used a convenience sample \( (n=82) \) from 11 for-profit and not-for-profit assisted and supported-living facilities in a large Midwestern state of the US. Participants were 65 years and older who self-reported chronic pain lasting for six months or longer. Residents were excluded if they had a history of cancer or overt psychiatric disorders such as schizophrenia or if they were unable to verbalise the purpose of the study or were physically unable to participate. Study procedures were explained to the participants and informed consent was obtained. Institutional review board approval to conduct the study was sought and obtained.

**Variables, definitions and measures**

The independent variable was the use/non-use of medication interventions, and dependent variables were chronic pain and perceived comfort. Treatment was not offered to participants and data were obtained through participant self-report. The independent variable was obtained through a single question to participants: ‘Have you used one or more non-medication approaches/techniques to help manage your chronic pain in the past 24 hours? Yes/No.’

One question was asked to capture participants who were taking medication: ‘Do you take pain medication? Yes/No.’

After showing participants a list of 22 items to illustrate and aid recall of non-medication interventions (Box 1), participants were asked verbally whether they used non-medication interventions or used none, and their answer was circled on the survey. Depending on their responses, participants were assigned to one of two groups (use or non-use) for comparison. Sociodemographic information, including age, gender and marital status, was obtained from the self-reported demographic section of the survey.

Chronic pain was measured using the Brief Pain Inventory (BPI) (Cleeland and Ryan 1994) and comfort was measured using the General Comfort Questionnaire (GCQ) (Kolcaba 2003).

The BPI, originally developed from the Wisconsin Brief Pain Questionnaire (Cleeland 1985), was designed to assess pain in patients with cancer and rheumatoid arthritis. The BPI contains 15 questions eliciting participants’ pain intensity and pain interference over the 24 hours before completing the questionnaire. Questions on the BPI elicit how pain severity has interfered with a person’s general activity, mood, walking ability, sleep and enjoyment of life, as rated on a 0 to 10 Likert scale where 0 = does not interfere and 10 = completely interferes (Cleeland and Ryan 1994, University of Texas MD Anderson Cancer Center 2019).
For this study, the operational definition of chronic pain was determined from the BPI, with a higher total score indicating a higher severity of pain and a lower total score indicating a lower severity of pain (Cleeland and Ryan 1994).

The GCQ consists of 48 statements measuring an individual’s perceived comfort. Physical, emotional, motivation, pain, spirituality, environment and social support concepts are measured in this questionnaire. Statements are rated on a six-point Likert scale where 1 = strongly disagree and 6 = strongly agree. The Cronbach alphas for the GCQ range from 0.71 to 0.82, which indicate a moderate internal consistency, that is, how reliably test items that are designed to measure the same concept do so (Kolcaba 2003). In addition, previous use of a modified 28-item GCQ with older people with urinary incontinence revealed a Cronbach alpha of 0.72 to 0.83 with a test-retest reliability of 0.72 and 0.71, that is, the reliability of a test measured over time (Dowd et al. 2002). The operational definition of comfort was determined from Kolcaba’s GCQ, with a higher total score indicating a higher level of perceived comfort and a lower total score indicating a lower level of perceived comfort (Kolcaba 2003).

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Procedure
To obtain permission to access each facility, we contacted assisted and supported-living facility administrators by telephone and a face-to-face meeting. Eleven letters of facility commitment were drafted, signed and approved by the institutional review board. On gaining access to the facility, a researcher set up a recruitment table with information about the study. For illustration and recall, a poster with 22 non-pharmacological interventions for chronic pain treatment supported by literature was displayed on an easel. At all times when the recruitment table was set up, researchers were present to provide information, answer questions about the study and help older people with reading or comprehension of written or verbal material. All written material had a readability of fifth-grade reading level, that is, 11 years of age. Each potential participant was read the informed consent. A researcher explained that participation was voluntary and that participants could withdraw from the study at any time.

Participants were asked to provide a brief summary of the purpose of the study in their own words. They were asked to sign a copy of the informed consent document and were given a copy. Informed consent and questionnaire completion occurred in a confidential area such as a resident’s private room or private conference room. Questionnaires were completed separately for each participant, with a researcher present to answer any questions. Breaks were offered to participants during informed consent and questionnaire completion.

Data collection occurred between September 2016 and September 2017.

Statistical analysis
All data were analysed using the Statistical Package for Social Sciences 22.0. Descriptive statistics of frequencies, percentages, means and standard deviations were computed to characterise the sample age, gender and marital status, length of time with pain and current use of pain medication.

Multivariate analysis of variance (MANOVA) was performed on two dependent variables of pain and comfort, with the independent variable of using non-medication interventions. To eliminate a potential contamination of using pain medication on perceived comfort and chronic pain from the effect of using non-medication interventions, we split the data for participants taking pain medication and participants not taking pain medication.

Table 1. Non-pharmacological intervention list

| » Heat therapy: heating pads, warm blankets, heat patches or any other heat sources used for comfort or pain relief on any body part |
| » Cold therapy: ice packs, cooling blankets, cold patches or any other cold sources used for comfort or pain relief on any body part |
| » Massage therapy/touch |
| » Physical therapy |
| » Exercise |
| » Transcutaneous electrical nerve stimulation |
| » Qigong: exercise with deep breathing |
| » Aromatherapy: candles, incense, pot pourri or scents that are pleasant or relaxing to smell, such as lavender, eucalyptus, chamomile and so on |
| » Laughter or humour |
| » Music |
| » Acupuncture |
| » Biofeedback: relaxation technique used by health professionals to relax muscles, sometimes a machine is used to monitor brainwaves, breathing and muscle activity |
| » Spiritual activity or religion |
| » Cognitive behaviour therapy |
| » Family presence |
| » Support group(s) or presence of friends |
| » Self-management/stress reduction education |
| » Mindfulness-based meditation |
| » Guided imagery |
| » Changing position |
| » Nutrition: certain foods that may provide comfort |
| » Environmental temperature and surrounding room provide comfort |

medication. In MANOVA, Pillai’s trace was used as this test is considered the most robust in a pilot sample size.

Data were further analysed using MANOVA with Roy-Bargmann stepdown analysis, which tests the significance of the dependent variables individually (Tabachnick and Fidell 1996, Merler and Reinhart 2010, Kim and Mallory 2014). To determine if any differences in perceived comfort and pain existed between participants using non-medication interventions, Roy-Bargmann stepdown analysis was carried out separately on the pain scores and the comfort scores. All statistical significances were reported at $P \leq 0.05$.

**Results**

**Demographic data**

A typical participant in the final sample ($n=82$) was female ($n=61;74\%$) and widowed ($n=67;82\%$), taking pain medication ($n=66;80\%$) and with an average age of 83.49 years (SD=7.4). Demographic characteristics of the participants are presented in Table 1.

**Non-medication interventions, pain and comfort**

For participants who were not taking pain medication, MANOVA results revealed no significant differences for the combined dependent variables of chronic pain and perceived comfort between participants using non-pharmacological interventions and those not using non-pharmacological interventions (Pillai’s trace $V=0.202$, $F(2, 63)=1.64$, $P=0.231$, $\eta^2=0.202$). However, when participants were also taking pain medication, the combined dependent variables of chronic pain and perceived comfort were significantly affected by the use of non-pharmacological interventions (Pillai’s trace $V=0.115$, $F(2, 63)=4.09$, $P=0.021$, $\eta^2=0.115$). Participants using non-pharmacological interventions and taking pain medication had higher comfort scores and lower pain scores compared with participants using pain medication only. Those participants using only non-pharmacological interventions without pain medication had a lower comfort score and a higher pain score, which may indicate pain medication is an important variable in pain management (Table 2).

Roy-Bargmann stepdown analysis performed on the prioritised dependent variables revealed that participants taking pain medication and using non-pharmacological interventions had higher comfort scores (mean=226.32, SD=27.41) than those who took pain medication but did not use non-pharmacological interventions (mean=206.00, SD=34.81).

When pain scores were tested with comfort scores as covariates to see if the pain scores added to the comfort scores already tested, no significant difference was found on pain scores (stepdown $F(1, 64)=6.99$, $P=0.010$, $\eta^2=0.098$). Reliability testing on GCQ resulted in a Cronbach alpha of 0.92, meaning the concept of comfort was measured well by the GCQ.

The most common non-pharmacological interventions reported by the participants were

| Table 1. Descriptive characteristics of participants |
|-----------------------------|-----------------|-----------------|
| Variable | Mean (SD) | Range |
| Age | 83.49 (7.4) | 67-97 |
| Length of time with pain (years) | 14.59 (14.76) | 2-70 |
| Gender | | |
| Male | 21 | 26 |
| Female | 61 | 74 |
| Marital status | | |
| Widowed | 67 | 82 |
| Married | 11 | 13 |
| Divorced | 2 | 2 |
| Single | 1 | 1 |
| Other | 1 | 1 |
| Taking pain medication | | |
| Yes | 66 | 80 |
| No | 16 | 20 |
| Use of non-pharmacological intervention(s) | | |
| Yes | 50 | 61 |
| No | 32 | 39 |
| Most common non-pharmacological intervention | | |
| Exercise | 35 | 70 |
| Heat therapy | 23 | 46 |
| Spiritual activity or religion | 21 | 42 |
| Listening to music | 17 | 34 |
exercise (70%), heat therapy (46%), spiritual activity/recreation (42%) and listening to music (34%) (Table 1).

### Discussion

This pilot study was completed to determine whether the study protocols, data collection methods and instruments were feasible to use in the assisted and supported living facility populations. The study protocols, data collection methods and instruments were feasible to use in this population. In a modified future study, we would make three changes.

First, the exclusion criteria of ‘diagnosis of cancer’ was too broad and excluded many potential participants who had been diagnosed with and successfully treated for any type of cancer, including, for example, minor non-painful skin cancer, possibly decades before this study. Instead, we would exclude only participants who had an active diagnosis of cancer.

Second, in the data collection, we measured pain medication only as an either/or category and therefore were not able to evaluate it in detail as a variable in the main analysis. For future research, we would collect more specific data on pain medication such as the name of drug, dose, frequency and route to capture relevant variables.

Third, the questionnaire was lengthy, with 50 minutes per participant required for completion; a shorter version of the GCQ exists but it has not been assessed for reliability and the research team could not recommend its use. Therefore, to make it possible to survey a larger sample of participants, researchers must allow enough time or involve more researchers to assist in the recruitment and data collection phase.

### Limitations
There are limitations to this study. Participants were not randomly selected. A small participant pool led to a lack of statistical power, which limited the validity and generalisability of the conclusions, as type II error, that is, not observing a difference when a difference existed, cannot be ruled out. The study may not be generalised, because it occurred in one region in the Midwest of the US. A larger sample of participants meeting the statistical power and greater international representation would be optimal in future studies.

All information obtained on the questionnaires was self-reported by participants. Self-reported data from participants about pain and comfort may be imprecise due to recall of pain and feelings of comfort within the past 24 hours. Self-reported data rely on a participant recalling pain and comfort within a 24-hour period, which may reflect inaccurate recall of events. Future studies should include increased assessment of pain and comfort immediately after pain non-medication treatments and/or medication.

Potential bias may exist, as the design included pain medication as a confounding variable captured by one question: ‘Do you take pain medication? Yes/No.’

In future studies, additional data on pain medication will be captured including, but not limited to, generic name, route, administration frequency/time of day and percentage of relief after administration.

Finally, no treatment was offered to participants in this study. Based on this pilot study, future studies will include a trial in which one or more non-medication interventions, such as listening to music and/or physical therapy, are provided.

### Table 2. Mean comfort and pain scores comparison

<table>
<thead>
<tr>
<th>Variable</th>
<th>Not taking pain medication</th>
<th>Taking pain medication</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Independent variable</strong></td>
<td><strong>Dependent variable</strong></td>
<td><strong>Univariate F</strong></td>
</tr>
<tr>
<td>Comfort</td>
<td>Comfort</td>
<td>6.99</td>
</tr>
<tr>
<td>Pain</td>
<td>Pain</td>
<td>0.19</td>
</tr>
</tbody>
</table>

*General Comfort Questionnaire, lowest score=48, highest score=288; †Brief Pain Inventory, lowest score=0, highest score=110*
Relaxation techniques will be applied and evaluated for efficacy for decreasing pain and increasing comfort in older adults.

**Conclusion**

This pilot study helps us begin to understand chronic pain management issues in older people in assisted and supported-living facilities. Participants who used non-medication interventions in addition to pain medication had a significant difference in perceived comfort and pain compared with those using pain medication only. Comfort scores may be influenced by pain medication, not exclusively influenced by non-medication interventions.

The findings support guideline recommendations by the AMDA (2012) and ACPA (2019) to use non-pharmacological interventions as adjunct treatment for chronic pain. Older adults must manage chronic pain with multimodal approaches to maximise the potential for better pain relief (Chapman et al 2010, Boltz et al 2016, Darnall 2018, ACPA 2019).

Healthcare professionals and administrators in assisted and supported-living facilities must evaluate multiple outcomes associated with chronic pain to develop an individual treatment plan for residents. General principles from this study may be applicable to nurses worldwide, as chronic pain remains a global issue. This study may assist in planning effective pain treatment for older adults with chronic pain.

**References**


American Medical Directors Association (2012) Pain Management in the Long Term Care Setting: Clinical Practice Guideline. AMDA, Columbia MO.


